# DRAFT
## POOLING BEFORE PORTING
## Task Force Report

Table of Contents

Appendix A: Wireless Pooling Timeline

1.0 Wireless Pooling Establishment

  1.1 NRUF and Pooling Administrator Forecast

  Given the number of NPAs that will be in state pooling trials by the end of 2001 and the Pooling Administrator (PA) roll-out schedule of 21 NPAs every three months starting in March of 2002, it is estimated that 160 NPAs will be pooled by November 24, 2002. Therefore, per the FCC mandate, wireless Service Providers (SP) must:

  - START DATE: Submit an NRUF and PA forecast by Thousand Block by rate in these 160 NPAs by August 1, 2002
  - END DATE: Complete the Pool Establishment for 160 NPAs by November, 24, 2002

  The NRUF data will be based upon June 30, 2002 utilization. Thus, between June $30^{th}$ and August $1^{st}$, wireless SPs must:

  - Complete their Block Protection and freeze utilization of all blocks that are not needed to maintain a 6 month inventory
  - Identify the Thousand Block surplus (donation) and deficiency (demand) by rate center for the PA

  1.2 Block Donation

  After the blocks that can be donated have been identified, SPs must perform intra-Service Provider ports for numbers assigned in contaminated blocks, such that SPs should:

  - Complete Intra-Service Provider ports between August $1^{st}$ and August $31^{st}$ of 2002,
  - Begin Block Donation on September 4, 2002

  Per the Wireless Number Portability timeline, September 4, 2002 is the target date for wireless LNP-capability. This is the earliest date that wireless SPs can donate Thousand Blocks. However, this date is predicated on timely delivery and testing of LNP query software for virtually every wireless switch type deployed within the United States. Today, it is still uncertain whether certain switch vendors will have timely availability of LNP query software for deployment and testing. This is necessary for calls to or from pooled Telephone Numbers (TNs) to process correctly. Thus, vendor delays in LNP query software availability will impact Pooling Establishment and jeopardize its completion by the mandated November 24, 2002 deadline.

  After block donations are complete, wireless SPs can begin submitting applications for Thousand Blocks. After submission of requests, the PA must process the requests, all blocks must be activated in the NPAC, and advanced NPAC notifications are required for first ports. Because of the anticipated demand volume and the time

02/01/02

required to complete these procedures, there must be careful coordination of the quantity of requests submitted each day, such that these processes can be completed by November 24, 2002.


2.0 Wireless Pooling Study
   2.1 Pooling Establishment
      2.1.1 Sample Data
      Service providers (SP) completed pooling case studies through the following method.  Each SP selected, at a minimum, one pooled NPA that is currently in their footprint.  Using the selected NPA, the SP developed study data that resulted in the following:

- An NRUF and PA forecast for the selected NPA by rate center, by Thousand Block, by year
- Months to exhaust worksheets for each rate center to certify Thousand Block requirements
- Thousand Block donation identification
- Intra-service provider ports required for contaminated blocks

      2.1.1.1 Assumptions
      The assumptions used for the case study are as follows:

- Include expansion of network and footprint (initial codes)
- Forecast requirements for 3rd and 4th quarters of 2002, and $1^{st}$ and 2nd quarters of 2003 based on December 2000 data
- The forecast reflects a projection of exhaust of "current available numbers"
- Identify blocks for donation containing 10% or less contamination
- SPs are allowed 6 months worth of telephone number inventory

      2.1.1.2 Data
      Since the study data reflects forecast data it is considered proprietary.  Consequently, the SPs selected the NPAs at random from the list of pooled NPAs found on the NeuStar Web Site.  SPs submitted the carrier specific study data blind, e.g. the actual NPA was not identified.  Five NPA case studies were provided.  SPs used the INC Thousand Block Pooling Number Administration Guidelines, dated March 8, 2001, and the NRUF 502 form instructions off the NANPA.com web site, for determining the forecasting process requirements.

      2.1.1.3 Results
      The following represents the averages for Thousand Block requirements for $3^{rd}$ and $4^{th}$ quarter of 2002 developed from the 5 sample NPA case studies.  Therefore, these results when averaged characterize data for one NPA, assuming 5 wireless SPs per NPA.

- Average number of rate centers per SP per NPA = 6

- Average number of required blocks per rate center = 4
- Average number Thousand Blocks forecasted per NPA = 120; per SP =24
- Average blocks donated per NPA = 15; per SP = 3
- Average intra SP ports per NPA = 420; per SP = 84
- Average number of MTE worksheets per NPA = 30; per SP = 6
- Average number of Part 1a submissions per NPA = 30; per SP = 6
- Average number of Part 3 returns per NPA = 30; per SP = 6
- Average number of Part 1b submissions per NPA = 120; per SP = 24
- Average number of Part 4 submissions per NPA = 120; per SP = 24

2.2 Extrapolated Data

Sample NPA study data was provided by the industry as a means by which the national wireless-pooling load could be calculated, assuming a flash cut of NPAs on 11/24/02.  Average data was applied to 160 NPAs.

2.2.1 Assumptions
- 160 pooled NPAs  by 11/24/2002
- Average NPA data was developed from a sample of 5 NPAs
- All rate centers contained in the sample are participating in pooling

2.2.2 Results

Results provide an estimate of the national wireless-pooling load and its impacts between August 1$^{st}$ and November 24$^{th}$, 2002, on industry segments responsible for Thousand Block Pooling implementation.
- 19,200 Thousand Blocks forecasted for 2002 holiday season
- 2,400 Thousand Blocks identified for donations
- 67,200 intra SP ports related to contaminated blocks (average of 28 ports per Thousand Block)
- 4,800 MTE worksheets submitted from the SPs to the PA for Thousand Block certification
- 4,800 Part 1a submissions from the SPs to the PA
- 4,800 Part 3 returns from PA to SPs
- 19,200 Part 1b submissions from the SPs to the PA
- 19,200 Part 1b submissions from the PA to the NPAC
- 19,200 Part 4 submissions from SPs to PA

2.3 Network and Operations

The scope of the Network and Operations committee was to determine the additional implementation requirements, beyond those required for wireless porting, necessary to comply with the pooling order.

2.3.1 Assumptions
- NPAC Release 3.0 fully implemented in all markets
- No major changes to the INC guidelines for implementing wireless Thousand Block Pooling

02/01/02

- Pooling will be implemented in the same 100 MSAs as number portability
- All tasks required for wireless number portability are completed per the recommended Wireless Industry Number Portability Timeline

2.3.2 Data

All numbers in the grid below are expressed in "Full Time Equivalents *(FTE)* person days. Whether the implementation requirements are reported as a single number (as in the case of Company B, category – Operations) or broken down by the various Operations and Network categories, it should be understood that these implementation tasks could be completed simultaneously. Therefore, the actual number of days required to complete these tasks should be less than the total FTEs in days given below.

| Systems to be Modified | Company A | Company B | Company C | Company D | Company E |
|---|---|---|---|---|---|
| OPERATIONS: | | 480 | | | |
| TN Inventory | 0 | | 65 | 80 | 100 |
| Order Entry | 0 | | 65 | 0 | 100 |
| Order Management | 0 | | 65 | 0 | 0 |
| Provisioning | 0 | | 65 | 0 | 100 |
| Customer Care | 0 | | 65 | 0 | 0 |
| Billing Systems | 0 | | 65 | 0 | 0 |
| Reporting | 0 | | 100 | 0 | 100 |
| SOA/LTI | 0 | 0 | 150 | 0 | 100 |
| NETWORK: | | | | | |
| Translations Tables | 0 | 0 | 0 | 0 | 0 |
| LSMS | 0 | 0 | 0 | 0 | 0 |
| NPDBs (STP/SCPs) | 0 | 0 | 0 | 0 | 0 |

2.3.3 Results

The results show that there is a wide disparity between SPs in the incremental implementation requirements and associated duration required to implement pooling beyond the efforts for porting. One possible explanation is that the incremental requirements for pooling are interdependent with the operational support systems changes made by the SP for porting and the degree of system integration.

3.0 Pooling Administrator Requirements
   3.1 Pool Administration Process

# DRAFT
# POOLING BEFORE PORTING
## Task Force Report

Per the INC Thousand Block Pooling Administration Guidelines, the Pooling Administrator (PA) is allowed to maintain 6 months worth of telephone number inventory in their rate center pools.

3.1.1 Process for Block Forecast

On August 1$^{st}$ of 2002, the wireless SPs will provide to the PA their Thousand Block pooling forecast requirement for the 2002 holiday season.  Forty percent of wireless carriers' annual growth is experienced over the holiday season. It is imperative that the PA acts expeditiously in processing the forecast per the INC guidelines Section 6.0, e.g. the PA must complete the FCC form 520 (NRUF) and forward to NANPA within 14 calendar days of the August 1, 2002.

3.1.2 Process for Block Donation

SPs will freeze blocks for donation at the same time they develop their Thousand Block forecasts. By August 1, 2002, SPs will provide to the PA a summary of their Thousand Block surplus or deficiency by rate center.

3.1.3 Establish Pools

Based on current guidelines, the earliest possible date that the PA can replenish Thousand Block pools through NANPA to accommodate wireless demand is October 20, 2002.[1]  The PA will size the industry inventory pool as necessary based on the forecasts received.  The PA shall maintain a six-month inventory of TNs in each rate center.

3.2 Managing Volumes

In order to implement pooling in 160 NPAs by November 24, 2002, the suggested milestone sequence of Thousand Block Pooling (TBP) implementation found in the INC Thousand Block Pooling Guidelines must be adjusted to accommodate the wireless demand and the FCC mandated deadline.  The following is a suggested implementation plan:

1. Meeting to coordinate TBD deployment schedule:  TBD, prior to PA national TBP roll out schedule publication
2. Forecast Report Date:  8/01/02
3. Block Protection Date: 8/01/02
    4. Block Donation Identification: 8/01/02
5. PA Assessment of Industry Inventory Surplus/Deficiency:  8/15/02
6. Intra-SP ports: 8/30/02
7. Block Donation: Start Date ~ 9/4/02; End Date ~ 10/20/02
8. Pool Start Allocation: Start Date ~  9/11/02; End Date ~ 10/20/02
9. NPAC Activate Thousand Blocks: Start Date ~ 9/23/02; End Date ~ 11/22/02
10. Mandated Implementation Date:  11/24/02

4.0 NPAC Requirements
   4.1 Pooled Block Activation Download
       4.1.1   Release 2.0/1.4

---

[1] Per Section 7.2.6 of the INC Thousand Block (NXX-X) Pooling Administration Guidelines, the PA has 66 days from the PA assessment of Industry Inventory Surplus/Deficiency to the CO Code activation.

# DRAFT
## POOLING BEFORE PORTING
## Task Force Report

The NPAC SMS sends the Subscription Version (SV) for an activated Number Pool port via the NPAC SMS to the Local SMS interface and/or the Local SMSs. The SV create requirements for performing a Number Pooling port are executed for each individual TN. No notifications are sent to the SOA systems of the old service provider or the new service provider (the block holder) as a result of a pooled number port. However, as with existing porting activity, downloads of Subscription Versions to the Local SMSs occur. Without the Efficient Data Representation (EDR) offered in Release 3.0, individual TNs within the Thousands Block are download from the Local SMS to the Number Portability Data Base (NPDB) one TN at a time.

4.1.2 Release 3.0

The NPAC SMS is required to inform all Service Providers about the allocation of the NPA-NXX-Xs for pooling to the Block Holder via the SOA to NPAC SMS Interface and/or NPAC SMS to Local SMS interface. With Release 3.0, the Pooled Port is sent with Efficient Data Representation, e.g. the entire Thousands Block is broadcast with one SV Create, and the Thousands Block is then downloaded from the Local SMS to the SPs NPDB a Thousand Block at a time.

4.2 NPAC Release Comparison
- NPAC Release 2.0 /1.4 functionality,
- Activation messages for pooled blocks occur on a per TN basis (i.e. 1000 messages downloaded per pooled block).
- Based on current NPAC downloads rates and under ideal conditions, this will take approximately 3 minutes.
- NPAC Release 3.0 functionality
- Provides for the download of a pooled block of information in a single message (Efficient Data Representation or EDR).
- This single message, under ideal conditions, will take less than 2 seconds.
- The reduction in the number of NPAC downloads will be directly proportional to the number of service providers who are EDR capable.

5.0  LSMS / NPDB Requirements
5.1 Partial LSMS Failures
In October of 1998, the Slow Horse Subcommittee defined the Slow Horse problem and began deliberations to reduce the number of SP partial LSMS failures. It was noted that the partial LSMS failures affected at least 1-1/2 to 2% of the wireline porting volume. The NPAC suggested that SPs' LSMSs should meet the same service level requirement as the NPAC, as defined in Exhibit N. The Slow Horse Committee reported to the North American Numbering Council (NANC) in September of 1999 that it had drafted two LSMS requirements, the LSMS broadcast receipt speed capability (LSMS performance requirement) and the LSMS availability to receive NPAC broadcasts. The last meeting of the Slow Horse Committee was in November of 2000. Its status report to the NANC stated that the subcommittee members had

widely divergent views and that the LSMS %Availability requirement was sufficient to deal with inadequate SP LSMSs. To monitor performance, periodic reports of the production of LSMS performance are needed from the NPAC. NANC Change Order 219 is required to define the report contents and to allow for collection of the data to prepare the report. The NANC 219 Change Order is in the Statement of Work 26 to be negotiated as part of Release 4.0. After 2 –1/2years of deliberation, the partial LSMS failure issues associated with wireline porting have not been resolved pending a Change Order to collect performance data and generate a report.

For wireline porting and pooling:
- The average volume is 1 to 1-1/2 million ports per month
- The impact is at least 20,000 to 30,000 subscribers per month (at 1-1/2 to 2% partial LSMS failures)

For wireless porting and pooling:
- The estimated volume for $4^{th}$ quarter of 2002 is 22 million
- The anticipated impact will be at least 330,000 subscribers

5.2 EDR versus Non-EDR Applications
Pooling is the porting of 1000 consecutive numbers at one time to a block holder. These numbers may be stored and transmitted in communications with the NPAC as 1,000 individual numbers or data base entries, or as just one range of numbers or one database entry using EDR. Clearly, EDR is much more efficient and greatly reduces the quantity of NPAC messaging. EDR will be available when NPAC Release 3.0 is implemented. EDR capability is currently available from LSMS and STP/SCP vendors.

For a non-EDR capable LSMS to receive a Thousand Block download:
- The LSMS must receive a 1000 transmissions
- The download rate is about 3 minutes per transmission

For a EDR capable LSMS to receive a Thousand Block download:
- The LSMS must receive 1 transmission
- The download rate is about 2 seconds

5.3 Resynchronization
Each time an LSMS looses association or connection with the NPAC, upon reconnecting, the service provider must resynchronize its LSMS with the NPAC. Resynchronization of an EDR capable LSMS will occur much faster and will be much less susceptible to additional failures than for a non-EDR capable LSMS. The SPs must wait for modifications or subsequent porting of TNs in the block. This will apply to every one of the 19,200 Thousand Block downloads. Normally, the block gets clean of partial failures before the block holder starts assigning TNs to the customer. Given the continued problems of SP partial LSMS failures, the time

required for SPs to resynchronize will increase with the download of 19,200
Thousand Blocks.

## 6.0 SOA/LTI Requirements

### 6.1 Impact of Wireless Pooling and Porting Volumes

With the addition of wireless pooling and porting volumes, the SOA to NPAC SMS
interface must be capable of managing a greater request and notification load than it
currently handles. The Thousands Block forecast for the wireless SPs 2002 holiday
season is 19,200 Thousand Blocks, assuming participation in 160 pooled NPAs.
Further, wireless porting volumes are expected to reach current national churn rates
of 2.5% per month, i.e. 2.8 million ports per month. The wireless pooling and porting
volumes will add 20+ million numbers to the LNP network utilizing the LNP LRN
architecture by year-end of 2002.

### 6.2 Impact of Wireless Pooling and Porting Message Volumes

With the implementation of Release 3.0 and the upgrade of the NPAC processors
(CPUs), notifications are generated much more quickly than before. Because of this
increase in efficiency for processing Thousand Block Create requests and porting
requests, resulting notifications are generated much faster.

- For wireless Thousands Block activations, there is a possibility of 3 to 5 different
  types of notifications that can be sent from the NPAC to the SOA if the SOA
  supports Thousands Block pooling functionality. Notification messages related to
  pooled blocks are sent one message per pooled block. Because of this efficiency
  wireless Thousand Block pooling is not viewed as a potential problem for the
  SOA.
- For each wireless port request there is a possibility of 6 types of request messages,
  and 17 notifications types. The average number of request messages per wireless
  port is estimated to be about half of the 6 or 3 requests: the create, the modify, and
  the activate requests. The average number of notifications per wireless port is
  expected to be about 8: create, modify, activate, T1 and T2 timers expire, and an
  estimated average of 3 partial failure notifications.
    - Wireless porting volumes are estimated to be equivalent to existing
      wireless national churn rates, i.e. 2.5% per month.
    - Monthly wireless porting volumes will reach 2,800,000.

NPAC/SOA messages related to wireless porting will add an additional maximum of
30,800,000 messages per month.

### 6.3 Impact of Wireline Pooling and Porting Volumes

Under today's wireline pooling and porting volumes, the resulting NPAC notification
spikes, or peaks, will cause a backlog in the transmission of the data. During these
delays, other notifications are also backlogged and the queue begins to grow. In some
cases, if the NPAC does not receive mechanized confirmation within the specified
retry period that the SOA received the notification, the NPAC will drop the SOA-
NPAC association.

# DRAFT
## POOLING BEFORE PORTING
## Task Force Report

7.0 Release 3.0 Interface Difficulties

After Release 3.0 in the Northeast, the SOA message backlog issue became worse for the SPs operating in that region. The installation of Release 3.0 incorporated new hardware at the NPAC, an upgrade that produces and broadcasts transactions much faster to the regional SOAs. Consequently, the Subscription Versions (SVs) and notification messages generated by the NPAC as a normal part of daily porting transactions are significantly overloading the SOA-NPAC interfaces. The overload is apparent only in the ILEC SOAs because the ILEC is involved in the majority of port transactions.

7.1 Message Types Generating the Heaviest Loads

Two message types -- per-TN SV modification done, and per-TN status change -- represent 68% of the traffic between the NPAC and SOA. This appeared due largely to per-TN notifications for SV-modify messages and partial-fail list content changes.

The SV modify messages are generated because the new SP needs to change the original SV Create message to correct or modify a specific entry.

The partial-fail list content changes are generated as LSMSs throughout the region experience successful download of the overdue broadcast. Notifications regarding partial failures are sent to the SPs' SOAs.

7.2 Interface Problem Defined

The data shows that the NPAC to SOA interface cannot support the volumes of notifications that the NPAC is generating during peak periods. Based upon a SOA Traffic Analysis that NeuStar performed on May 16th, two peak periods were identified: 3:00 PM and 9:00 PM. During these peak periods the backlog of notification messages required 35 minutes and 45 minutes to successfully complete the broadcast to ILEC SOAs in the region. There were two long periods of time that day during which porting activity is delayed. Service Providers on the LNP Network are unaware of essential porting activity during these periods. Since it is the customer who is ultimately affected by this problem, the SP must wait out the backlog before they can proceed with accuracy.

7.3 Interface Solutions Recommended

The following solutions have been recommended by the LNAPWG:
- Short Term - increase the tunable retry period from 15 minutes to 60 minutes
- Interim - NPAC Release 3.1
  - Elimination of SV cancel at expiration of the T2 timer
  - Prioritization of Notifications
  - TN Range Notification. Currently SOA systems receive notifications on a TN by TN basis. This change order will allow them to receive a single notification from the NPAC for a TN range instead of an individual notification for each TN.
  - Long Term – Increase NPAC/SOA interface throughput

# DRAFT
## POOLING BEFORE PORTING
## Task Force Report

7.4 Wireless Pooling and Porting Impact on Queuing of NPAC Download Messages
The addition of the projected wireless pooling and porting loads will cause more NPAC/SOA/LSMS delays. Because delays are already experienced with existing wireline loads, wireless pooling and porting volumes will increase the peaks and will result in increased backlogs and longer delays.

Currently, with Release 2.0 or Release 3.0, the NPAC download messages are queued on a "first come first served basis".

NPAC Release 3.1 will prioritize messages and for the most important porting requests and notifications allow a higher processing and broadcasting priority. It will also drastically reduce the number of messages related to porting activity by consolidating messages for number ranges to 1 set of messages per range rather than a 1000 sets of messages per range. The LNPAWG is hopeful that Release 3.1 will be available for trial by the end of 2001. General availability of Release 3.1 is dependent upon Release 3.0. If Release 3.1 is successful in the Northeast Region, i.e. improves the performance of the existing NPAC/SOA interface, it will be rolled out with 3.0 in the remaining regions.

Wireless pooling and porting will add significantly to the volume of NPAC download messages. This increase in download volume will further contribute to peaks, backlogs, and port activation delay. Therefore, implementation of Release 3.1 prior to wireless porting and pooling volumes is a necessity, in order to prevent even more customers from experiencing an "out of service" condition.

8.0 Risks and Recommendations
8.1 Risks
LNP Capability
- *MIN/MDN separation to support nation wide roaming:* Wireless Thousand Block pooling will place 19.2M wireless customers with pooled numbers, where their MIN is different than their MDN, into the network.
- *Switch vendor compliance with Phase II Call Delivery:* Without Phase II Call Delivery, wireless SPs do not have the capability to recognize that a call has been routed to their switch with the LRN. The switch must be able to recognize the LRN is in the called number field and the actual called number is in the GAP field. By 11/24/02, 19.2M wireless customers with pooled numbers will be routed using an LRN.

Wireless Thousands Block Pooling
- *160 + NPAs:* Wireless SPs and supporting industry segments, e.g. PA, NPAC, etc., must be able to manage implementation of Thousand Block pooling in 160 NPAs
- *Managing roll out in 4 months*: All 160 NPAs must be implemented in a four month period. This constraint is based upon the wireless seasonal growth characteristic where 40% of their growth takes place over the holiday season, from 11/15 to 1/15 each year. It is assumed that wireless SPs will require Thousands Blocks from all 160 NPAs.

02/01/02

# DRAFT
## POOLING BEFORE PORTING
## Task Force Report

Thousands Blocks available for timely assignment

- *Full NXX codes available for assignment to the PA*: With so many NPAs in jeopardy, many of the codes the PA will require will have to be obtained through the lottery process.
- *Imminent Exhaust Proceedings*:  If the PA is unsuccessful in the lottery an imminent exhaust process needs to be implemented in order to support the massive undertaking of implementing pooling in 160 NPAs within 4 months
- *Managing the volume of paper work:* To establish the pools, there will be over 50,000 forms that must be processed by the SP, the PA, State Regulators, NANPA, and the NPAC in order to meet the mandated date.  Each industry segment must be able to meet their critical dates.

Number of Thousands Blocks that can be broadcast on a daily basis

- *NPAC/LSMS slow horse issue*: Without Efficient Data Representation regional networks will experience an increase in partial failures which will slow the broadcast of pooled blocks to SPs' Local SMSs.
- *NPAC Release 3.1:* This release is needed to improve the performance of the NPAC/SOA interface.

Customer Service Outages - Porting Customers

- *NPAC Release 3.1  - prioritizes porting messages:* Without Release 3.1 NPAC messages are handled on a first come first serve basis.  Customers who want to port their number from one SP to another may be delayed due to a backlog of messages on the network.

## 8.2 Recommendations

A Joint planning task force, including regulators, wireless SPs, PA, and vendors, should be formed to accomplish the following:

- Determine critical path to 11/24/02 wireless pooling launch
- Determine pooled NPA roll out schedule
- Determine Number of Thousand Block that can be activated each day
- Identify risks and constraints associated with the Wireless Industry Pooling Timeline (Appendix A)
- Ensure national roll out of 3.0 and 3.1 prior to June of 2002
- 6 month waiver of Thousand Block reclamation in order to assign and activate 1000s blocks early
- Mandate EDR
- Focus wireless resources on pooling and those aspects of the LNP architecture required for pooling
- Complete Pooling in the top 100 MSAs per the national roll out schedule before launching Local Number Portability